



PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Docket No: L10389

MCCURDY

Appln. No.: 09/662,181

Group Art Unit: 1762

Confirmation No.: 2443

Examiner: Bret P. Chen

Filed: September 14, 2000

For: METHOD FOR DEPOSITING TITANIUM OXIDE COATINGS ON FLAT GLASS

SECOND SUPPLEMENTAL DECLARATION UNDER 37 C.F.R. § 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Richard J. McCurdy, hereby declare and state:

1. I am the same Richard J. McCurdy as identified in the Declaration Under 37 C.F.R. 1.132 Declaration (hereinafter "my original Declaration") filed in the above-referenced Application on June 20, 2003, as well as the Supplemental Declaration Under 37 C.F.R. § 1.132 (hereinafter "my supplemental Declaration") filed in the above-referenced Application on March 1, 2004.

2. I have reviewed the Final Office Action dated August 29, 2003, issued in connection with the above-referenced application, the Response Under 37 C.F.R. § 1.116 filed October 27, 2003, the Advisory Action dated January 30, 2004, and the Office Action dated May 11, 2004.

3. The following experimentation was conducted at my request and under my supervision.

4. Float glass was coated with titanium oxide in accordance with Examples 2, 5 and 7 of the above-identified application and samples were obtained.

5. The crystallinity of the titanium oxide coating on the glass samples prepared in accordance with Examples 2, 5 and 7 was analyzed using X-ray diffraction. A Scintag XRD instrument was used with Cu Ka radiation (1.54060 Angstroms, 45kV, 40 mA). Data was taken in 2Theta scan mode from 0-70 degrees at a fixed incident angle. The stepsize was 0.02 degrees at a scan rate of 0.1degrees/min. The crystallinity of these samples was confirmed as evidenced by Attachments C (Example 2), D (Example 5) and E (Example 7) hereto which are X-ray diffraction patterns for the samples. The X-ray diffraction patterns for each sample show multiple peaks at the same locations as the peaks in the standard powder diffraction files for crystalline titania and therefore confirm the crystallinity of these samples.

6. In addition, the photocatalytic activity of the samples was confirmed using fourier transform infrared spectroscopy. The samples were spin coated with 20 microliters of 0.0088M stearic acid in methanol solution. The samples were spun immediately for 1 minute to dryness. The IR absorption spectrum of the stearic acid film was then taken on a Nicolet Magna 750 FTIR before UV exposure and used as the baseline. All of the samples were referenced against untreated (i.e. clean) titania coated glass. The maximum absorption at 2850 and 2925 cm^{-1} (C-H stretch of the stearic acid) was recorded. The samples were then irradiated in a Q.U.V cabinet with the film toward the UVA 351 lamps for 10 minutes. The radiation intensity was 0.84W/m²/nm. The IR absorption spectra were then remeasured and recorded. The UV exposure was repeated for additional periods with FTIR spectra recorded in between such that total UV exposures of 0, 10, 30 and 60 minutes were achieved. The rate of destruction of the stearic acid film was quantified by the decay of the C-H peak heights and is presented in the below Table and Figure. Stearic acid is a low volatility model organic molecule similar in chemical structure to common organic contaminants that can be found in oils and dirt. It has a long, organic non-polar backbone with a polar tail. Under UV exposure, the titania will absorb the UV light and generate activated surface species which then oxidize and destroy the organic contaminates on the surface of the glass and in the process regenerate a clean titania surface for further catalysis. Here the model organic is stearic acid. The fact that this complex compound

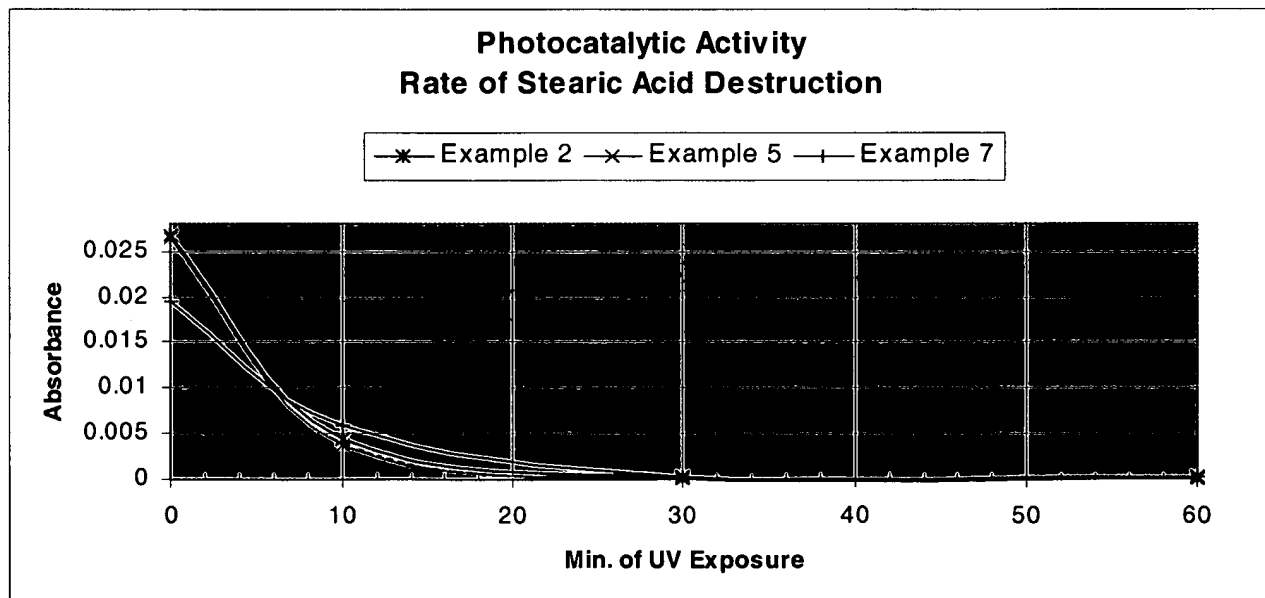
can be destroyed and removed from the titania glass surface under UV exposure demonstrates the "self-cleaning" attributes of the invention.

7. The sample produced in accordance with Examples 2, 5 and 7 exhibited excellent photocatalytic activity. Exposure to UVA 351 at $0.84 \text{ w/m}^2/\text{nm}$ decomposed over 99% of the stearic acid within 60 minutes as shown in the following Table and Figure.

TABLE

Minutes	0	10	30	60
Example 2				
Abs. Pk. Ht.	0.0266	0.0044	0.00018	0.00024
% removed	0	83.5	99.3	99.1
Example 5				
Abs. Pkt. Ht.	0.0265	0.0038	0.00007	0.00005
% removed	0	85.7	99.7	99.8
Example 7				
Abs. Pkt. Ht.	0.0195	0.0060	0.00015	0.00018
% removed	0	69.3	99.2	99.1

FIGURE

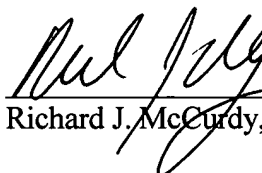


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8. Following closely the method to calculate photocatalytic reaction rate found in U.S. Patent No. 6,027,766, I calculated the rate for the samples prepared by reproducing Examples 2, 5 and 7. To get the rate, I integrated the absorption band intensity of the C-H stretch (2925 wavenumber) for exposure times of 0, 10 and 30 minutes. The integrated absorption was then plotted as a function of time and a best fit line was calculated for the data points. The absolute value of the slope of this line is the reaction rate in units of $1/(\text{cm}\cdot\text{min})$. The values I found for the reaction rate from these samples are : 0.03 (Sample 2), 0.03 (Sample 5) and 0.029 (Sample 7).

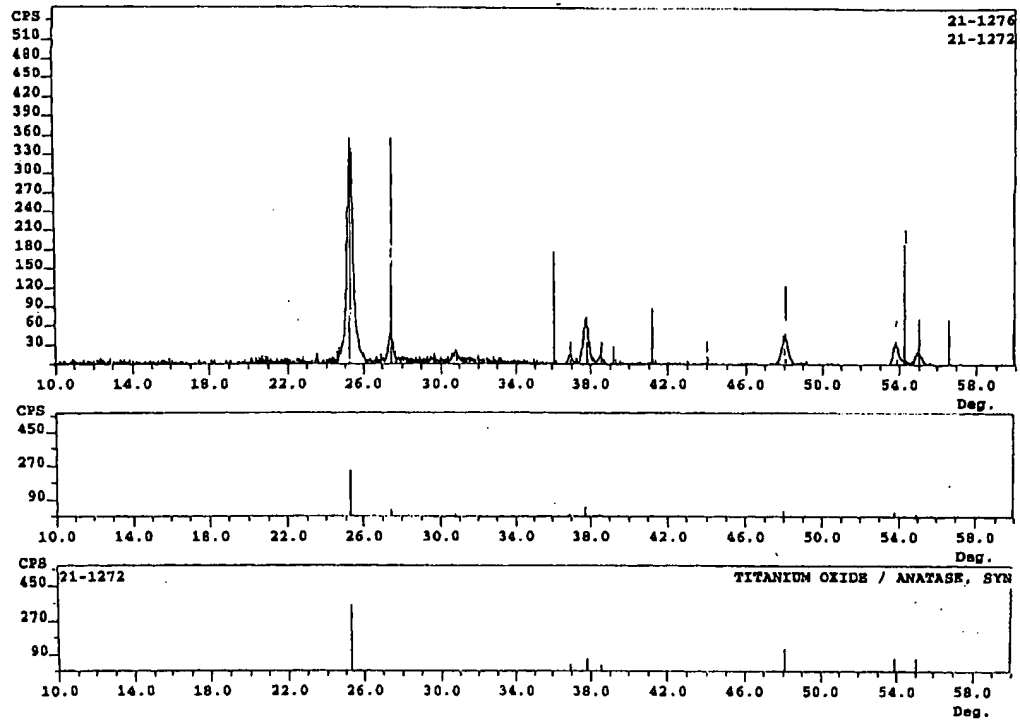
I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: JULY 27, 2004


Richard J. McCurdy, Ph.D

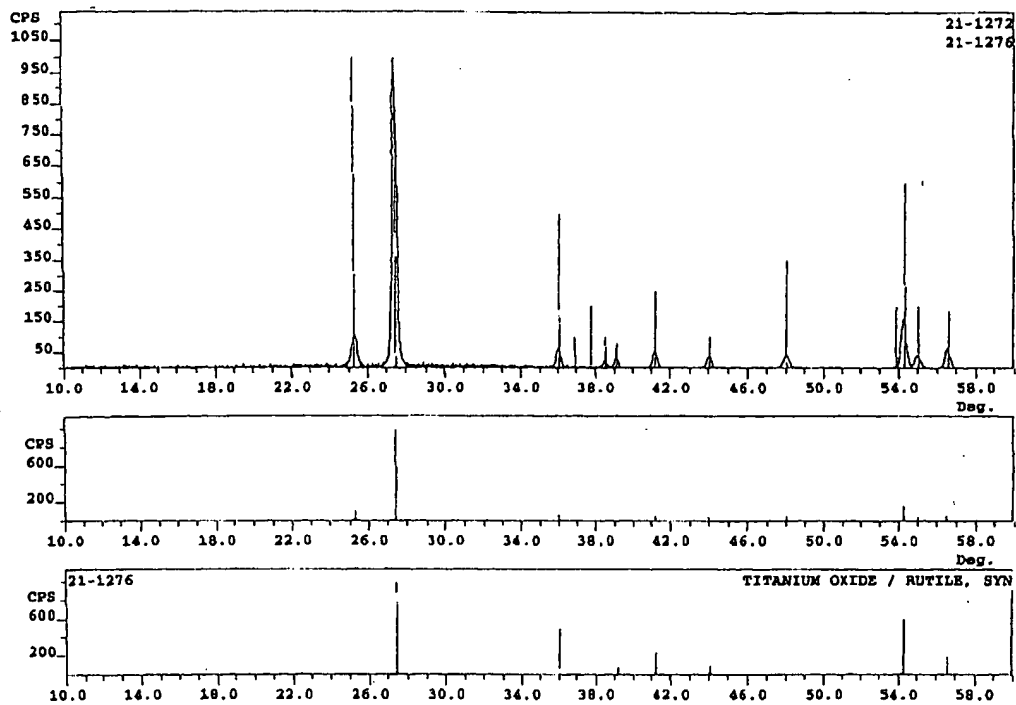
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ATTACHMENT C



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ATTACHMENT D



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ATTACHMENT E

